

## 4.2 Notes Day 2

Warm-up:  $f(x) = x^2 - 4x + 5$       $a = 1$     $b = -4$     $c = 5$

Find the axis of symmetry:

$$x = \frac{-b}{2a} = \frac{-(-4)}{2(1)} = 2 \quad \boxed{x=2}$$

Find the vertex:

$$\boxed{(2, 1)}$$

Name the y-intercept:

$$\boxed{(0, 5)}$$

Reflected point:

$$\boxed{(4, 5)}$$

Identify the solutions:

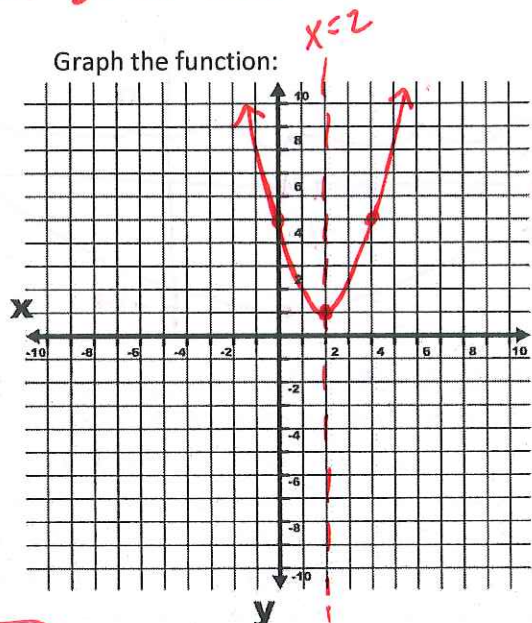
$\boxed{\text{None}}$

Domain:

$\boxed{\text{All Real \#s}}$

Range:

$$\boxed{\{y / y \geq 1\} \text{ or } [1, \infty)}$$



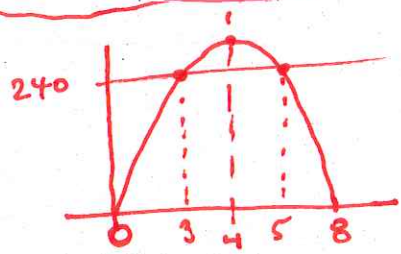
Solve word problems by identifying the roots and/or the vertex of a quadratic function.

*Note: Solving by hand matches graph below it.*

- 1) The equation  $h(t) = 128t - 16t^2$ , where  $h(t)$  is the height of an object in feet and  $t$  is the time in seconds, is representing the height of a baseball.

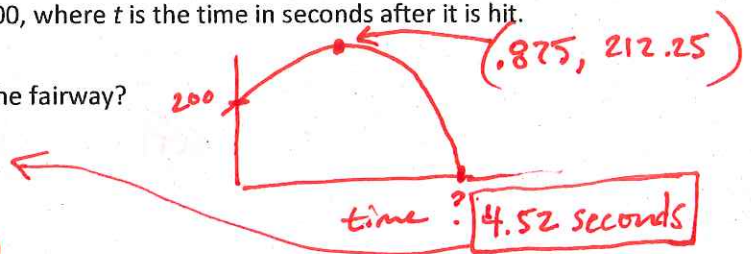
- How long does it take for the ball to hit the ground?  
 $\mathbf{8 \text{ seconds}}$
- When did the ball reach its maximum height?  
 $\mathbf{4 \text{ seconds}}$
- What was the ball's maximum height?  
 $\mathbf{256 \text{ feet}}$
- At what time did the ball reach the height of 240 feet?  
 $\mathbf{3 \text{ seconds } \& \; 5 \text{ seconds}}$

$$\begin{aligned} h(t) &= 128t - 16t^2 \\ 0 &= 128t - 16t^2 \\ 0 &= 16t(8-t) \\ 16t &= 0 & 8-t &= 0 \\ t &= 0 & t &= 8 \end{aligned}$$

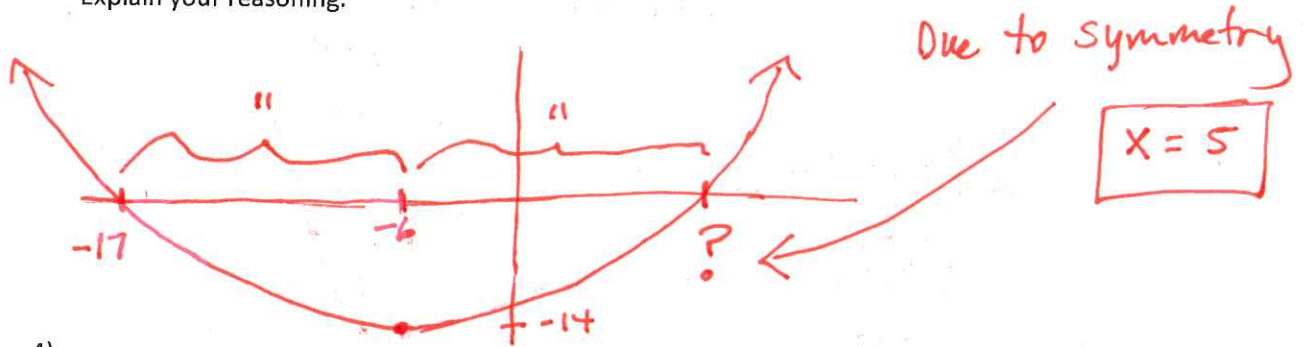


- 2) A golfer hits a ball from an elevated tee box 200 feet above the fairway. The ball's height above the fairway is modeled by  $h(t) = -16t^2 + 28t + 200$ , where  $t$  is the time in seconds after it is hit.

- How long will it take the ball to reach the fairway?
- What was the ball's maximum height?  
 $\boxed{212.25 \text{ ft}}$
- When did the ball reach its maximum height?  
 $\boxed{.875 \text{ seconds}}$

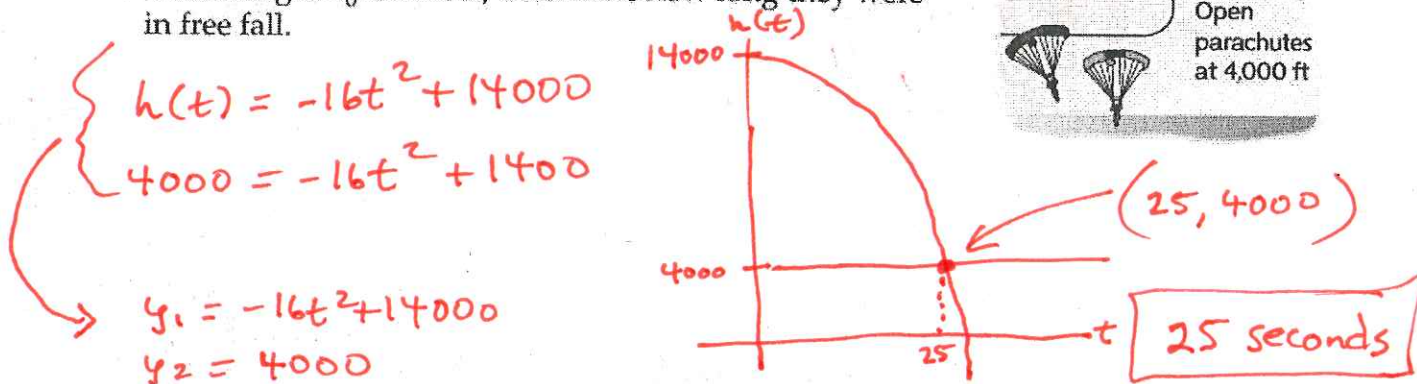
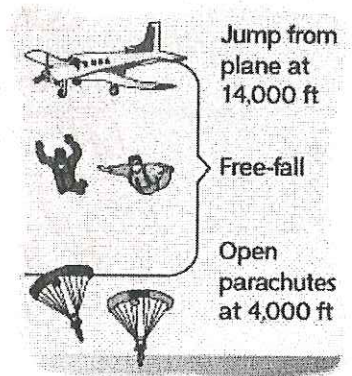


- 3) If a quadratic function has a minimum at  $(-6, -14)$  and a root at  $x = -17$ , what is the other root?  
Explain your reasoning.



4)

**SKYDIVING** In 2003, John Fleming and Dan Rossi became the first two blind skydivers to be in free fall together. They jumped from an altitude of 14,000 feet and free fell to an altitude of 4000 feet before their parachutes opened. Ignoring air resistance and using the formula  $h(t) = -16t^2 + h_0$ , where  $t$  is the time in seconds and the initial height  $h_0$  is in feet, determine how long they were in free fall.



- 5) The profits for Mr. V's company can be represented by the equation  $y = -3x^2 + 18x - 4$ , where  $y$  is the amount of profit in hundreds of thousands of dollars and  $x$  is the number of years of operation. He realizes his company is on the downturn and wishes to sell before he ends up in debt.

- When will Mr. V's business show the maximum profit?

after 3 years

- What is the maximum profit?

23 hundred thousand = \$2,300,000

- At what time will it be too late to sell his business? (When will he start losing money?)

after 5.77 years

